

**MEMORANDUM**

TO: Christina Scheltema  
PM Team Reviewer

Betty Shackleford  
Chief  
Reregistration Branch 3  
Special Review and Registration Branch 7508C

FROM: James K. Wolf  
Soil Scientist

THRU: Arnet Jones  
Chief  
Environment Risk Branch 3  
Environmental Fate and Effects Division 7507C

RE: The Interagency Study of the Impact of Pesticide Use on Ground Water in North Carolina. March 4, 1997 (Ground -water contamination from disulfoton use on Christmas trees in NC was the only topic considered in this assessment).

DATE: July 28, 2000

**Conclusions:**

Based upon this monitoring study and OPP's understanding of the use practices of disulfoton (e.g., hand broadcast below a tree) associated with Christmas tree production in North Carolina, no additional ground-water monitoring for disulfoton resulting from Christmas tree production is necessary at this time. This recommendation could change depending upon the results of other monitoring efforts (e.g., NAWQA) associated with other uses (e.g., high frequency of detections) or concern for degradates not considered in the monitoring study. Detection limits or limits of quantification should be lower in any broader base sampling.

There were no detections of disulfoton, disulfoton sulfoxide, and disulfoton in the ground- water monitoring study conducted in North Carolina. Efforts were made to place the wells in vulnerable areas where the pesticide use was known, so that the pesticide analyzed for would reflect the use history around the well. Limitations of the study include that sites were sampled only twice and the limits of detections were high (e.g., > 1.0 µg/L) for some of disulfoton analytes. Uncertainties associated with the study include whether two samples from eight wells are adequate to represent the ground-water concentrations of disulfoton residues, did

DRASTIC correctly identify a site's vulnerability, and were the wells placed down-gradient of the use areas.

### **General:**

The North Carolina Departments of Agriculture (NCDA) and Environment, Health, and Natural Resources (DEHNR) conducted a cooperative study under the direction of the North Carolina Pesticide Board. The purpose of the statewide study was to determine if the labeled uses of pesticide products were impacting the ground water resources in North Carolina.

The study was conducted in two phases. In phase I, 55 wells in the DEHNR Ground Water Section's ambient monitoring network representing the major drinking water aquifers of the state were sampled at least twice and analyzed for selected pesticides. In phase II, 97 cooperator monitoring wells were installed and subsequently sampled at least twice in 36 counties across the North Carolina. Sites for the cooperator monitoring wells were chosen based on an evaluation of the vulnerability of ground water to risk of contamination from the use of pesticides.

Monitoring wells were located adjacent to and down-gradient from areas where pesticides were reported to have been applied (within 300 feet) during the previous five years. Wells were constructed so that the shallowest ground water could be collected for analysis. The objective of these criteria was to use a scientific method for determining monitoring well locations so that the results could be used as an early indication of the potential for problems associated with pesticides leaching to ground water. The study authors make the following statement, *"Results cannot be interpreted as representing the quality of ground water near pesticide use areas statewide because the study methods targeted areas of highly vulnerable ground water"*.

The study used tools and information available at the time of the study to identify vulnerable locations for well placement. This included statewide agricultural data from the N.C. Agricultural Statistics which were used to identify crop growing areas, the USEPA DRASTIC method (Aller et al., 1987) was used to locate the most vulnerable locations in the target crop growing areas, and local county agents of the USDA Natural Resources Conservation Service (NRCS) helped identify cooperators-farmers for placement of wells. The Pesticide Study staff and county agents also met with the cooperators to obtain pesticide use information. Other studies have shown that DRASTIC is not as good a method to identify vulnerable areas as hoped. The study appeared to QA/QC practices.

Wells were sampled in two rounds in phase II, approximately six months apart. If a chemical was detected in any well, a follow-up sample was collected from the same well and analyzed for the same chemical.

Seven of the 55 ambient monitoring wells in phase I had pesticide residues detected in at least one sample collected. In the cooperator phase (II) of the study, 26 of 97 wells had pesticide

detected in at least one water sample collected from each well. None were disulfoton residues.

### **Disulfoton:**

Disulfoton, disulfoton sulfone, and disulfoton sulfoxide represented three analytes measured in the study. Two different labs conducted the analysis of water samples. The stated limits of quantification were 1.0 µg/L, 2.3 µg/L, and not established for disulfoton, disulfoton sulfone, and disulfoton sulfoxide, respectively for the Division of Environmental Management Laboratory. The second lab's limits of quantification were 0.3 µg/L, 3.8 µg/L, and 0.38 for disulfoton, disulfoton sulfone, and disulfoton sulfoxide, respectively for the North Carolina Department of Agricultural Laboratory.

Disulfoton residues were monitored for in five North Carolina counties, Alleghany, Ash, Beaufort, Madison, and Robeson. Seven wells were located in Christmas Tree growing areas, one in wheat growing county, and 2 in tobacco areas. The breakout of wells sampled and analyzed for disulfoton in each county by crop are summarized in the Table 1. There were no detections of disulfoton residues in any samples collected in the study. Simazine and lindane were detected at two of the Christmas tree sites

**Table 1. Summary of sites samples for disulfoton or Christmas tree growing area in North Carolina.**

County	Crop	Disulfoton Use	Ground Water Detection
Alleghany	Christmas Trees	no	no
Ash	Christmas Trees	no	no
Ash	Christmas Trees	yes	no
Ash	Christmas Trees	yes	no
Alleghany	Christmas Trees	yes	no
Alleghany	Christmas Trees	yes	no
Ash	Christmas Trees	yes	no
Beaufort	Wheat	yes	no
Madison	Tobacco	yes	no
Robeson	Tobacco	yes	no

Aller, L.T., T. Bennett, J.H. Lehr, R.J. Petty, and G. Hackett. 1987. DRASTIC: A Standardized

System for Evaluating Ground Water Pollution Potential Using Hydrogeologic Setting. USEPA Document # EPA/600/2-85-018.